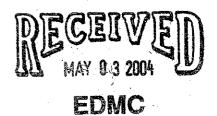
DOE/RL-2004-38 Revision 0

Radioactive Air Emissions Notice of Construction for a Fuel Storage Facility at the Plutonium Finishing Plant Complex, 200 West Area, Hanford Site, Richland, Washington

Prepared for the U.S. Department of Energy Assistant Secretary for Environmental Management





United States Department of Energy P.O. Box 550

Richland, Washington 99352

Project Hanford Management Contractor for the U.S. Department of Energy under Contract DE-AC06-96RL13200

Radioactive Air Emissions Notice of Construction for a Fuel Storage Facility at the Plutonium Finishing Plant Complex, 200 West Area, Hanford Site, Richland, Washington

March 2004

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1		TERMS
2		
4	ALARA	as low as reasonably achievable
5	ALARACT	as low as reasonably achievable control technology
6		and the state of t
7	BARCT	best available radionuclide control technology
8		
9	CCC	core component container
10 11	CFR Ci	Code of Federal Regulations
12	cm ²	curie
13	CIII	square centimeters
14	DOE-RL	U.S. Department of Energy, Richland Operations Office
15	dpm	disintegrations per minute
16	DOT	U.S. Department of Transportation
17		
18	FFTF	Fast Flux Test Facility
19	· · · · · · · · · · · · · · · · · · ·	
20	HPT	health physics technician
21 22	ISC	intoning stone so coals
23	150	interim storage cask
24	LIGO	Laser Inferometer Gravitational Wave Observatory
25	-	
26	MEI	maximally exposed individual
27	MPR	maximum public receptor
28	mrem	millirem
29		
30	NESHAP	National Emission Standards for Hazardous Air Pollutant
31	NOC	notice of construction
32 33	PCM	noviadia applimentant management
33 34	PFP	periodic confirmatory measurements Plutonium Finishing Plant
35	PTE	potential to emit
36		potential to time
37	RWP	radiation work permit
38		
39	SEPA	State Environmental Policy Act of 1971
40		
41	TEDE	total effective dose equivalent
42	777 A C	W 1. A A I
43 44	WAC	Washington Administrative Code
45	WDOH	Washington State Department of Health
73		

METRIC CONVERSION CHART

Into metric units

Out of metric units

If you know	Multiply by	. To get	If you know	Multiply by	To get
y	Length			Length	/
inches	25.40	millimeters	millimeters	0.03937	inches
inches	2.54	centimeters	centimeters	0.393701	inches
feet	0.3048	meters	meters	3.28084	feet
yards	0.9144	meters	meters	1.0936	yards
miles (statute)	1.60934	kilometers	kilometers	0.62137	miles (statute)
	Area			Area	
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.09290304	square meters	square meters	10.7639	square feet
square yards	0.8361274	square meters	square meters	1.19599	square yards
square miles	2.59	square	square	0.386102	square miles
_		kilometers	kilometers		
acres	0.404687	hectares	hectares	2.47104	acres
	Mass (weight)			Mass (weight)	
ounces (avoir)	28.34952	grams	grams	0.035274	ounces (avoir)
pounds	0.45359237	kilograms	kilograms	2.204623	pounds (avoir)
tons (short)	0.9071847	tons (metric)	tons (metric)	1.1023	tons (short)
	Volume			Volume	
ounces (U.S., liquid)	29.57353	milliliters	milliliters	0.033814	ounces (U.S., liquid)
quarts (U.S., liquid)	0.9463529	liters	liters	1.0567	quarts (U.S., liquid)
gallons (U.S., liquid)	3.7854	liters	liters	0.26417	gallons (U.S., liquid)
cubic feet	0.02831685	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.7645549	cubic meters	cubic meters	1.308	cubic yards
	Temperature			Temperature	
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy		Energy			
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.94782	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure		Force/Pressure			
pounds (force)	6.894757	kilopascals	kilopascals	0.14504	pounds per
per square inch					square inch

Source: Engineering Unit Conversions, M. R. Lindeburg, PE., Third Ed., 1990, Professional Publications, Inc., Belmont, California.

RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION 2 FOR CONSTRUCTION AND OPERATION OF A FUEL STORAGE FACILITY AT 3 THE PLUTONIUM FINISHING PLANT COMPLEX, 200 WEST AREA, HANFORD SITE, RICHLAND, WASHINGTON 4 5 6 7 This document serves as a notice of construction (NOC) pursuant to the requirements of Washington 8 Administrative Code (WAC) 246-247-060, and as a request for approval to construct pursuant to 40 Code 9 of Federal Regulations (CFR) 61.07, for construction and operation of a fuel storage facility at the 10 Plutonium Finishing Plant (PFP) Complex. 11 12 The PFP presently is being deactivated. One category of radioactive material at PFP requiring appropriate management is unirradiated fuel assemblies and pins that are stored at PFP. Alternative 13 storage of the fuel assemblies/pins at PFP is necessary pending final disposition of the fuel (e.g., transport 14 offsite). Some fuel assemblies/pins would be removed from the current storage configuration and placed 15 16 in a consolidated fuel storage facility within the PFP Complex fenceline and/or repackaged for shipment. 17 18 The estimated potential total effective dose equivalent (TEDE) to the maximally exposed individual 19 (MEI) resulting from the unabated radioactive emissions from construction and operation of the fuel 20 storage facility is 5.5 E-05 millirem per year. Because there is no credit taken for abatement equipment 21 for the fuel storage facility, the abated TEDE to the MEI also is 5.5 E-05 millirem per year. 22 23 24 1.0 LOCATION 25 Name and address of the facility, and location (latitude and longitude) of the emission unit: 26 The PFP Complex is located in the 200 West Area (Figure 1). The address for the PFP Complex and 27 28 geodetic coordinates are as follows: 29 30 U.S. Department of Energy, Richland Operations Office (DOE-RL) Hanford Site 31 32 Richland, Washington 99352 200 West Area, PFP Complex 33 34 35 46° 32' 59" North Latitude 36 119° 37' 59" West Longitude. 37 38 39 2.0 RESPONSIBLE MANAGER 40 Name, title, address and phone number of the responsible manager: 41 42 Mr. Matthew S. McCormick, Assistant Manager for Central Plateau 43 U.S. Department of Energy, Richland Operations Office 44 P.O. Box 550 45 Richland, Washington 99352 46 (509) 372-1786. 47 48

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1

3.0 PROPOSED ACTION

2 *Identify the type and proposed action for which this application is submitted.*

3 4 5

1

The proposed action is to install concrete containers within the PFP Complex and transfer fuel assemblies/pins currently stored in various configurations to the concrete containers and/or transportation containers. The anticipated emissions associated with this activity are insignificant.

6 7 8

9

4.0 STATE ENVIRONMENTAL POLICY ACT

10 If the project is subject to the requirements of the State Environmental Policy Act (SEPA) contained in chapter 197-11 WAC, provide the name of the lead agency, lead agency contact person, and their phone 11

12 number.

13 14

The proposed action categorically is exempt from the requirements of SEPA under WAC 197-11-845.

15 16 17

5.0 PROCESS DESCRIPTION

18 Describe the chemical and physical processes upstream of the emission unit.

19 20

A description of the activities associated with fuel repackaging and storage are provided in the following sections.

21 22 23

24

5.1 FACILITY DESCRIPTION

25 The concrete containers (Figure 2) would be installed as an array of 14 containers. Existing fuel packages

26 would be transferred to an area immediately adjacent to the concrete container prepared to receive the

27 fuel. After loading the fuel (via crane), each concrete container would be closed and managed as a point

source. The concrete container would be either closed with a seal or vented passively through a NucFil® 28 29

or equivalent filter.

30 31

FACILITY ACTIVITIES

The general chemical and physical processes associated with fuel transfer activities at the storage facility would consist of the following.

33 34

32

35 Fuel assemblies/pins repackaging and storage activities would be conducted outdoors. All work would be performed in accordance with approved radiological control methods and as low as reasonably achievable 36 37 (ALARA) program requirements. These requirements would be carried out through activity work

38 packages and associated radiological work permits.

39 40

41

42

Presently, at the PFP Complex, there are closed interim storage casks (ISCs) that each contain a core component container (CCC). A CCC contains fuel received from the Fast Flux Test Facility (located in the 400 Area of the Hanford Site). Five (5) of the CCCs have residual surface contamination associated

2

43 with them due to handling at FFTF. For conservatism, it is assumed that residual surface contamination

44 also might be associated with the fuel assemblies/pins (fuel assemblies/pins are considered sealed

sources). 45

[®] NucFil is a trade name of Nuclear Filter Technology, Golden, Colorado.

1 2

For the 5 ISCs with contaminated CCCs, the lids of each ISC would be removed and the CCCs transferred via crane to a new concrete container. After loading the CCC (via crane), each concrete container would be closed and managed as a point source. The emptied ISCs would be closed and returned to FFTF.

Nine additional concrete containers also would be used to store unirradiated fuel assemblies/pins currently stored at PFP in ventilated areas. These unirradiated fuel assemblies/pins would be transferred to the new storage containers in a similar manner as the aforementioned FFTF CCCs.

• As appropriate, contaminated clothing, coverings, and/or materials would be packaged and dispositioned in accordance with applicable facility waste handling procedures.

Periodic maintenance inspections of the closed concrete storage containers would be performed. No
use of additional containment enclosures or portable exhausters would be necessary for the
inspections.

16₃

Future decisions regarding final disposition of the fuel assemblies/pins could require offloading the fuel assemblies/pins directly into U.S. Department of Transportation (DOT)-approved shipping containers, or from the concrete containers into DOT-approved shipping containers. Offload into shipping containers would occur in a similar manner as the loading into the concrete containers.

6.0 PROPOSED CONTROLS

Describe the existing and proposed abatement technology. Describe the basis for the use of the proposed system. Include expected efficiency of each control device, and the annual average volumetric flow rate in cubic meters/second for the emission unit.

There is no credit taken for abatement control devices associated with the concrete storage containers. The concrete storage containers could be either closed or vented passively with a NucFil® or equivalent filter. Many of the emission controls used for the diffuse and fugitive emissions during repackaging and storage operations are administrative, based on ALARA principles and consist of ALARA techniques. The transfer and storage operations would be performed in accordance with the controls specified in a radiation work permit (RWP). It is proposed that the controls (at least as stringent as current controls regarding air emissions) specified in the RWP in effect at the time of operations be approved as low as reasonably achievable control technology (ALARACT) for the repackaging and storage activities.

Airborne radioactive emissions resulting from the packaging and storage operations would be minimal because of the following.

All packaging activities would be conducted under the auspices of radiological control technicians.

• The maximum radionuclide inventory associated with contamination would be very small, generally being limited to potential residual surface contamination of sealed sources.

• The likelihood of airborne particulate emissions being generated during storage would be very small as the fuel represents a sealed source, and the concrete container would be either closed or passively vented with NucFil® or equivalent filter.

7.0 DRAWINGS OF CONTROLS

Provide conceptual drawings showing all applicable control technology components from the point of entry of radionuclides into the vapor space to release to the environment.

Figure 2 shows the concrete storage container. Conceptual drawings of control technology components are not applicable because the emissions controls to be used during these activities are defined administratively, based on ALARA principles and consist of ALARA techniques. There is no credit taken for radionuclide abatement control technology equipment proposed for the repackaging or storage operations; the concrete storage containers could be either closed or ventilated passively through a NucFil® or equivalent filter.

8.0 RADIONUCLIDES OF CONCERN

Identify each radionuclide that could contribute greater than ten percent of the potential to emit TEDE to the MEI, or greater than 0.1 mrem/yr potential to emit TEDE to the MEI.

Cobalt-60, strontium-90, and cesium-137 would be present because of contamination on the 5 CCCs received from FFTF. Additionally, isotopes of plutonium, uranium, and americium-241 could be present due to potential residual contamination on all sealed sources (i.e., fuel assemblies and pins). As shown in Table 1, conservative dose/emission calculations are based on CCC surface contamination with Co-60, Sr-90, and Cs-137; residual contamination on sealed sources is calculated as alpha contamination (represented by americium-241) and beta/gamma (represented by Sr-90). [Note: assume fuel assemblies and pins are contaminated with alpha (Am-241) and beta/gamma (Sr-90) at 20,000 disintegrations per minute per 100 square centimeters each.]

9.0 MONITORING

Describe the effluent monitoring system for the proposed control system. Describe each piece of monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that could contribute greater than ten percent of the potential to emit TEDE to the MEI, or greater than 0.1 mrem/yr potential to emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions. Describe the method with sufficient detail to demonstrate compliance with the applicable requirements.

The potential unabated offsite dose associated with this activity is calculated to be less than 0.1 millirem per year. Therefore, in accordance with 40 CFR 61, Subpart H, periodic confirmatory measurements (PCM) would be made to verify the low emissions.

Diffuse/fugitive emissions would be monitored using the 200 West Area near-field ambient air monitors (PNNL-13910). Sample collection and analysis would follow that of the near-field monitoring program. Analytical results would be reported in an annual air emissions report. Currently this program continuously monitors emissions, and collects samples for alpha and beta ambient air activity every 2 weeks. Isotopic analysis currently is conducted every 6 months. The ambient air quality program remains the mechanism for satisfying the requirement for PCM.

The proposed PCM for the diffuse and fugitive emissions also would include radiological surveys during packaging operations (e.g., smears and hand-held radiation monitoring measurements on the exterior of the concrete storage casks). These methods of PCM are not a direct measurement of effluent emissions. The methods are intended to verify low potential for emissions.

Radiological surveys of the concrete storage containers would be performed after lid placement and periodically during storage. The extent and frequency of survey will be established based on potential radiological conditions, probability of change in conditions and area occupancy factors.

10.0 ANNUAL POSSESSION QUANTITY

Indicate the annual possession quantity for each radionuclide.

 The annual possession quantity of non-sealed sources is shown in Table 1, and is based on CCC contamination (Co-60, Sr-90, and Cs-137), and alpha (as Am-241) and beta (as Sr-90) from residual surface contamination on fuel assemblies and pins. For conservatism, 3.2 E-3 curies alpha (all alpha assumed to be Am-241, but likely is a mixture of americium and isotopes of plutonium) would be assumed to be associated with radiological contamination in a calendar year. The annual possession quantity represents all storage and handling activities described above.

11.0 PHYSICAL FORM

Indicate the physical form of each radionuclide in inventory: Solid, particulate solids, liquid, or gas.

The physical form of the radionuclides would be particulate solid. Negligible amounts of gaseous materials (e.g., radon) may be present.

12.0 RELEASE FORM

Indicate the release form of each radionulcide in inventory: Particulate solids, vapor or gas. Give the chemical form and ICRP 30 solubility class, if known.

For (conservative) purposes of emission and offsite dose estimates, the release of the radionuclides in the inventory presented in Section 10.0 is assumed to be in the form of particulate solids.

13.0 RELEASE RATES

Give the predicted release rates without any emissions control equipment (potential to emit) and with the proposed control equipment using the efficiencies described in subsection (6) of this section. Indicate whether the emission unit is operating in a batch or continuous mode.

The predicted release rates for each radionuclide, without any emissions control equipment (unabated), are presented in Table 1 using the appropriate WAC 246-247-030 (21)(a) release fractions. Because there is no credit taken for abatement controls, the abated releases are the same as unabated releases.

The packaging activities (into concrete storage containers or DOE shipping containers) would be conducted in a batch mode. Storage would be conducted in a continuous mode.

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14.0 LOCATION OF MAXIMALLY EXPOSED INDIVIDUAL

2 Identify the MEI by distance and direction from the emission unit.

The maximum public receptor (MPR) was assumed to be a non-DOE worker who works within the Hanford Site boundary and who eats food grown regionally. The MPR was assumed to be located at the Laser Interferometer Gravitational Wave Observatory (LIGO) (Figure 1). LIGO is approximately 22,000 meters southeast from PFP.

15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED INDIVIDUAL

Calculate the TEDE to the MEI using an approved procedure. For each radionuclide identified in subsection (8) of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any existing controls using the release rates from subsection 13 of this section. Provide all input data used in the calculations.

The CAP88 PC computer code was used to model atmospheric releases using Hanford Site-specific parameters¹. The MPR was assumed to be located at LIGO. Using calculated unit dose conversion factors, the estimated potential TEDE to the MEI resulting from the unabated fugitive emissions from fuel repackaging and storage activities is 5.5 E-05 millirem per year (refer to Table 1). There is no credit taken for abatement technology, so the abated TEDE also is conservatively estimated to be 5.5 E-05 millirem per year.

 The TEDE from all 2002 Hanford Site air emissions (point sources, diffuse, and fugitive sources) was 0.066 millirem (DOE/RL-2003-19). The emissions resulting from the operation of the PFP fuel storage facility, in conjunction with other operations on the Hanford Site, would not result in a violation of the National Emission Standard of 10 millirem per year for the Hanford Site (40 CFR 61, Subpart H).

16.0 COST FACTORS OF CONTROL TECHNOLOGY COMPONENTS

Provide cost factors for construction, operation, and maintenance of the proposed control technology components and the system, if a BARCT or ALARACT demonstration is not submitted with the NOC.

There is no credit taken for control technology components or systems; therefore, there are no cost factors associated with the proposed activity. The emission controls used during the repackaging and storage activities administratively would be defined and consist of ALARA principles and techniques.

17.0 DURATION OR LIFETIME

Provide an estimate of the lifetime for the facility process with the emission rates provided in this application.

Fuel repackaging and storage operations would be completed before Calendar Year 2016.

¹ Permission to use Hanford Site-specific parameters granted in letter from D.E. Hardesty of EPA to J.B Hebdon at DOE-RL, dated March 22, 2001, Subject: U.S. Environmental Protection Agency's third response to the new maximally exposed individual definition.

1	
2	

18.0 STANDARDS

Indicate which of the following control technology standards have been considered and will be complied within the design and operation of the emission unit described in this application:

ASME/ANSI AG-1, ASME/ANSI N509, ASME/ANSI N510, ANSI/ASME NQA-1, 40 CFR 60, Appendix A Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17, and ANSI N13.1.

7.

The listed control technology standards have been considered. No credit for abatement control equipment is taken. The administratively defined ALARA based emission controls proposed for these repackaging and storage activities are adequate to limit and control emissions. Therefore, none of the listed standards were found to be applicable.

19.0 REFERENCES

DOE/RL-2003-19, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2002, June 2003, U.S. Department of Energy, Richland, Washington.

HNF-3602, Revision 1, Calculating Potential to Emit Releases and Doses for FEMPs and NOCs, January 2002, Fluor Hanford, Richland, Washington.

PNNL-13910. Appendix 2, Hanford Site Near-Facility Environmental Monitoring Data Report for Calendar Year 2001, September 2002, Pacific Northwest National Laboratory, Richland, Washington.

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8

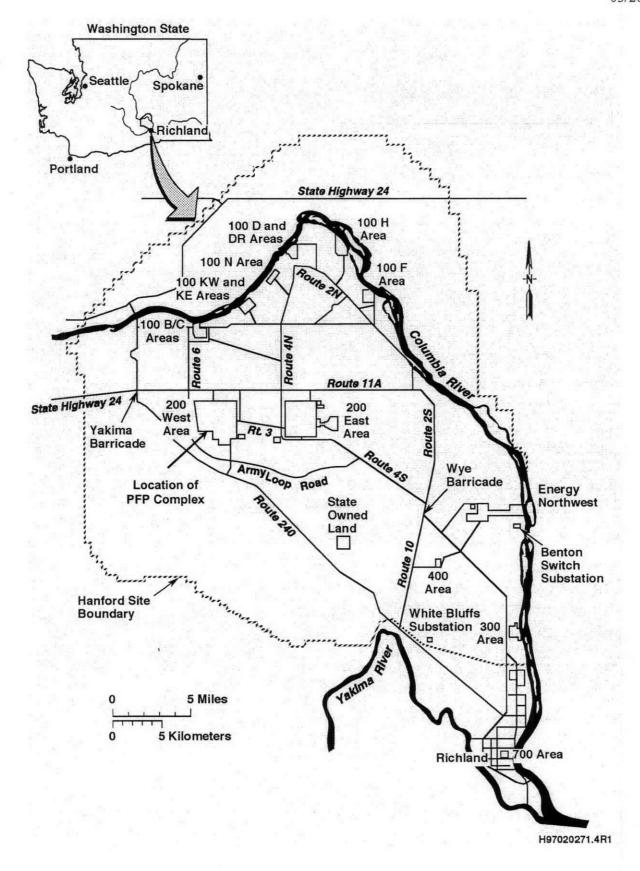


Figure 1. Hanford Site.

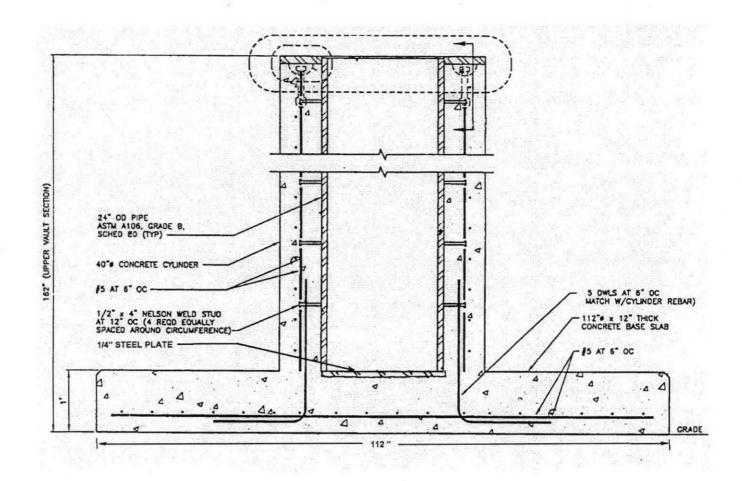


Figure 2. Concrete Fuel Storage Container.

Table 1. PFP Fuel Repackaging and Storage Dose Calculations.

Isotope	Inventory	Release	Unabated	mrem/Ci ^b	Dose
Isotope	(curies)	fraction	release (Ci)	inten/Ci	(mrem/year)
Cs-137	4.3 E-04	1 x 10 ⁻³	4.3 E-07	0.31	1.3 E-07
Co-60	1.4 E-05	1×10^{-3}	1.4 E-08	0.34	4.8 E-09
Sr-90 ^a	3.2 E-03	1 x 10 ⁻³	3.2 E-06	0.011	3.5 E-08
Am-241	3.2 E-03	1 x 10 ⁻³	3.2 E-06	17	5.4 E-05
Total	6.9 E-03		6.9 E-06		5.5 E-05

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^a Total Sr-90 from CCC and fuel ^b HNF-3602, Revision 1, onsite MPR, <40 meters effective release height.

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Enclosure 2

NOTICE OF OFF-PERMIT CHANGE FOR THE HANFORD SITE AIR OPERATING PERMIT (AOP) (NUMBER 00-05-006) FOR RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC), DOE/RL-2004-38, REVISION 0, CONSTRUCTION AND OPERATION OF A FUEL STORAGE FACILITY AT THE PLUTONIUM FINISHING PLANT COMPLEX, 200 WEST AREA, HANFORD SITE, RICHLAND, WASHINGTON

HANFORD SITE AIR OPERATING PERMIT

Notification of Off-Permit Change

Permit Number: 00-05-006

This notification is provided to Washington State Department of Ecology, Washington State Department of Health, and the U.S. Environmental Protection Agency as notice of an off-permit change described as follows.

This change is allowed pursuant to WAC 173-401-724(1) as:

- 1. Change is not specifically addressed or prohibited by the permit terms and conditions
- 2. Change does not weaken the enforceability of the existing permit conditions
- 3. Change is not a Title I modification or a change subject to the acid rain requirements under Title IV of the FCAA
- 4. Change meets all applicable requirements and does not violate an existing permit term or condition
- 5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.

	•		
Provide the following information pursuant to WAC-173-401-72	4(3):	•	
Description of the change:			
A Radioactive Air Emissions Notice of Construction, Radioactiv	e Air Emissions Notice of	Construction for	Construction
and Operation of a Fuel Storage Facility at the Plutonium Finish			
Richland, Washington (DOE/RL-2004-38, Revision 0), is being			
(Health) for approval and the U.S. Environmental Protection Age	ency (EPA) for approval.	A change in the	Hanford Site Air
Operating Permit is required to indicate this source of air emission			4
Date of Change:			
Effective date will be the approval by Health of the NOC.			,
Describe the emissions resulting from the change:			
Radioactive air emissions with the total estimated unabated and a	bated TEDE to the hypot	hetical MEI are 5	5.5 E-05 millirem
per year.	· · · · · · · · · · · · · · · · · · ·		
	•	•	and the second
			e e e e e e e e e e e e e e e e e e e
Describe the new applicable requirements that will apply as a			
Applicable requirements will be identified in approval notification	n by Health.		
		•	
For Hanford Use Only:			
AOP Change Control Number:	Date Submitted:	•	